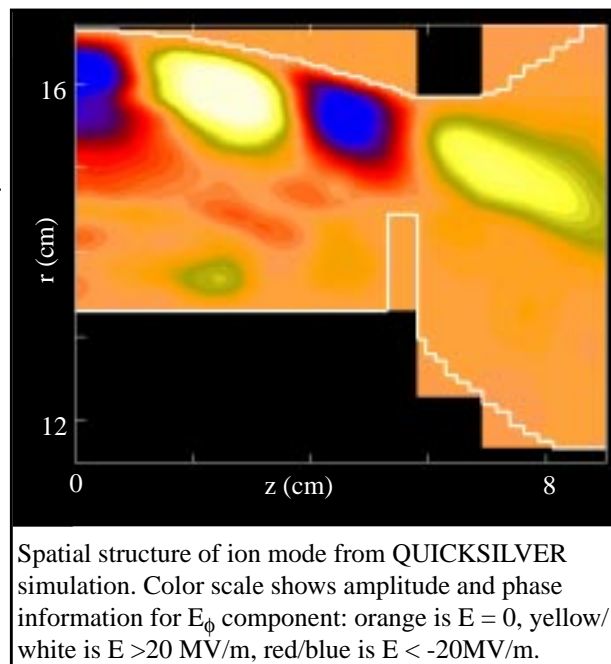


February 1995 Highlights of the Light Ion Inertial Confinement Fusion Program

PBFA-II experimentation was significantly curtailed this month because of safety issues related to operation of the ten-ton overhead crane used to install hardware. The first shot following this downtime was February 24. In the meantime, we performed further tests on the Integrated Test Facility of anode cleaning hardware and the new neodymium glass laser for Laser EVaporation Ion Source (LEVIS) experiments. In the future we will use this active source instead of the passive LiF source because of the greater lithium ion output expected.



New SABRE experiments show that further improvement in lithium beam intensity results from shortening the time delay between turning on the RF discharge cleaning pulse and the accelerator pulse. Defense Nuclear Agency (DNA) testing was done on SABRE during the latter part of February. Experiments with the active Exploding Metal Foil Anode Plasma Source (EMFAPS) will begin following the DNA testing.

PBFA-II diode simulations with top-bottom symmetry have just been completed using the 3-D, electromagnetic, particle-in-cell code QUICKSILVER and assuming field emission of Li^+ from the anode surface. These new simulations model a larger azimuthal section of the new diode hardware ($\pi/2$ and π). Mode coupling between the diocotron and ion modes does not significantly influence divergence growth. However, non-uniform Li^+ emission can cause an early transition to the ion mode instability, as shown in the figure. The simulations also suggest that a phase shift is present in the electric fields and charge densities as a function of the height of a simulated Faraday cup diagnostic above the diode centerline.

The Standoff Program has planned internal meetings in March to discuss diagnostics to measure the uniformity of the ion beam on PBFA II and SABRE. The physics of beam uniformity is intimately coupled to how the diode operates, the growth of microdivergence, and the ability to transport the beam. Optical components for the Zeeman diagnostic have been ordered. This diagnostic, being developed at NRL, will measure the net magnetic field inside a partially current-neutralized ion beam propagating in a gas.

Now that Key Decision One for the National Ignition Facility is approved, the effort to design target diagnostics and the power conditioning system has accelerated. A workshop was held in Santa Fe to review target diagnostics that will validate beam pointing and measure hohlraum properties. A conceptual design review of the switch testbed for the power conditioning system was attended by representatives from Sandia, Lawrence Livermore National Laboratory, and CEA in France. Discussions were held with Mike Jackson of the Atomic Weapons Establishment about possible collaboration on switch development.

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